

PATENT COOPERATION TREATY

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From the INTERNATIONAL BUREAU

NOTIFICATION OF ELECTION
(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C.20231
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 13 August 1999 (13.08.99)	
International application No. PCT/SE98/02360	Applicant's or agent's file reference 2988959
International filing date (day/month/year) 17 December 1998 (17.12.98)	Priority date (day/month/year) 18 December 1997 (18.12.97)
Applicant BOHM, Christer et al	

1. The designated Office is hereby notified of its election made:

 in the demand filed with the International Preliminary Examining Authority on:

13 July 1999 (13.07.99)

 in a notice effecting later election filed with the International Bureau on:

2. The election was was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer A. Karkachi Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

REC'D 10 MAY 2000

WIPO PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2988959	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE98/02360	International filing date (day/month/year) 17.12.1998	Priority date (day/month/year) 18.12.1997
International Patent Classification (IPC) or national classification and IPC7 H 04 Q 11/04, H 04 L 12/52, H 04 L 12/43		
Applicant Net Insight AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 13.07.1999	Date of completion of this report 03.05.2000	
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Telex 17978 PATOREG-S	Authorized officer Jan Silfverling/CL Telephone No. 08-782 25 00

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I. Basis of the report

1. This report has been drawn on the basis of (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.):

 the international application as originally filed. the description, pages _____, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of
pages _____, filed with the letter of _____, the claims, Nos. _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. _____, filed with the letter of
Nos. _____, filed with the letter of _____, the drawings, sheets/fig _____, as originally filed,
sheets/fig _____, filed with the demand
sheets/fig _____, filed with the letter of
sheets/fig _____, filed with the letter of _____,

2. The amendments have resulted in the cancellation of:

 the description, pages _____
 the claims, Nos. _____
 the drawings, sheets/fig _____

3. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

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V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims

1-12

YES

Claims

NO

Inventive step (IS)

Claims

1-12

YES

Claims

NO

Industrial applicability (IA)

Claims

1-12

YES

Claims

NO

2. Citations and explanations

The claimed invention relates to a method, an apparatus and a switch for switching data transferred in circuit switched channels between at least three unidirectional multi-channel time division multiplexed bitstreams that are accessed at respective ports of a switch. Data is transferred between said ports in circuit switched channels of an internal unidirectional multi-channel time division multiplexed bitstream that is accessed by said ports. Each one of said at least three bitstreams as well as said switch internal bitstream is divided into cycles, which in turn are divided into time slots. According to the claimed invention, data read from a time slot position of a first bitstream at a first port is tagged with a channel identifier. For each one of at least a second and a third bitstream of said bitstreams it is then selected into which respective time slot thereof to transmit said data based upon said identifier.

In the Written Opinion of 16 March 2000 the following documents were discussed:

Per Lindgren, "A Multi-Channel Network Architecture Based on Fast Circuits Switching", Licentiate Thesis, Royal Institute of Technology, Stockholm, ISSN 1103-534X, May 1996, (D1) describes a circuit-switched network architecture that is based on Dynamic synchronous Transfer Mode (DTM). DTM is designed for a shared medium topology, which facilitates distributed switching. The shared medium also has inherent multicast capabilities since a slot can be read by several nodes on a bus (page 57- page 62).

Each prototype node is implemented, based on the ideas of distributed switching, to be used both as a switch node and to be attached to host interfaces.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

A prototype node consists of three types of units. Firstly, a node has Fiber Access Units (FAU), each connecting the units in the node to one dual fiber bus. The FAU transfers data between the fiber and the other units in the node by multiplexing/demultiplexing between channels and slots. Secondly, a host obtains access to the DTM services through a Host Interface (HIF). Thirdly, a Node Controller (NC) controls the node and implements the DTM control protocol (DCP). The units in a node are connected by an interconnect that is implemented as a parallel Internal Ring Bus (IRB) (page 91-page 92).

All interfaces within a DTM prototype node are connected to an Internal Ring Bus (IRB), which handles the communication within the node (see Fig. 3.29). The interconnect can be seen as an internal switch fabric with ports. It is designed as a slotted ring bus on the backplane of the node (Fig. 3.32). One reason for using this design is that it is quite uncomplicated to support multicast by allowing the same data to be sent to several ports on the ring. To prevent congestion, the IRB is rate over-dimensioned, which guarantees that all four fiber units (FAU) of figure 3.32 will have access to the IRB for every slot in the cycle.

For each time slot on a fiber, the FAU first consults the channel table for incoming data. The FAU copies the contents of the slot and sends it on the Internal Ring Bus (IRB) tagged with a local address. The local address is divided into two parts, a physical address identifying the receiving unit, and a logical address used at the receiving unit. If the receiving unit is a host interface, the logical address is a logical channel identifier (LCI), which in turn is a local identifier of the channel. The Fiber Access Unit (FAU) performs the mapping between slot numbers and channels (page 93-page 98).

Christer Bohm, "The DTM Protocol- Design and Implementation", Licentiate Thesis, Royal Institute of Technology, Stockholm, ISSN 1103-534X, February 1994, (D2) also describes a circuit-switched network architecture that is based on Dynamic synchronous Transfer Mode (DTM). The slotted ring buses of an internal interconnect constitutes the switch fabric of a prototype node. There is one Internal Ring Bus (IRB) slot for each pair of adjacent units on the IRB and the IRB interface is a multi-channel interface (see fig. 28).

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Supplemental Box

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Continuation of: V

Each IRB slot for each pair of adjacent units could be regarded as a channel. Thus, the IRB is a multi-channel time division multiplexed bitstream that is accessed at respective ports connected to the IRB.

The FAU according to (D2) transfers data between the fiber and the other units in the node by multiplexing/demultiplexing between channels and slots. Its operation is table-driven; it has one channel table for outgoing data and one for incoming, and each table has one entry per slot in a cycle.

For incoming data, a channel identifier is used as a logical channel identifier in the host. When data enters the switch fabric, a local address tag is attached to the data item by the HIF or the FAU. The address tag contains a unit identifier (UI) and a channel identifier. The UI indicates the destination for the data item. For outgoing data, the channel identifier is used for addressing a slot number on the fiber bus and there is also a cycle buffer, where data is stored until it is written to a slot on the fiber bus (page 46- page 55).

In addition to (D1) and (D2), the following documents are cited in The International Search Report:

WO, 9736403, A1, (D3) discloses synchronisation of parallel bitstreams (page 8, line 29 - page 10, line 15).

Bohm et al., "The DTM Gigabit Network", Journal of High Speed Networks vol. 3 1994, (D4) discloses principles for DTM.

GB, 2263846, A, (D5) discloses an interface unit able to transmit or receive data independently in desired time slots (claim 1).

US, 5157657, A, (D6) discloses data transmission between stations connected to a first and a second bus, where at least one station comprising means for receiving, processing, and outputting slots of data transmitted on said two buses during each of a plurality of cycles (e.g. claim 25).

GB, 2238934, A (D7) discloses a copy fabric used for packet multicast (abstract).

WO, 9306675, A1, (D8) discloses a self-routing non-blocking multicast network (claim 1).

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Continuation of: V

The disclosures of documents (D3)-(D8) is not considered to bring a person skilled in the art to arrive at the invention as claimed in claims 1-12.

In the Written Opinion, it was stressed that the claimed invention according to claims 1-12 is not novel. Further, it was argued that the claimed invention according to claims 1-12, could not be considered to involve an inventive step with respect to the disclosures of (D1) and (D2).

In response to the Written Opinion, the Applicant has submitted supporting arguments regarding novelty and inventive step of the invention claimed. These arguments have resulted in that the Authority has adopted another, and different, opinion regarding patentable subject matter of the invention as claimed in claims 1-12.

The channel identifier (in D1 and D2), is used for identifying the slot that data should be mapped into, and the transfer of data is based on that the to which the data is to be sent is identified by the unit identifier (UI). Thus, the channel identifier is only used by the unit that is identified by the UI.

Since neither (D1), nor (D2), discloses or indicates the use of a common channel identifier for the mapping of data into slots in at least two ports, the invention claimed in claims 1-12 is novel.

To arrive at the invention as claimed in claims 1-12 from (D1) and (D2), one must solve the problem of enabling multicasting of data from one FAU to at least two FAUs. The method of the invention claimed, involving a common channel identifier is not considered the most probable way to solve this problem. The most probable way to solve this problem would be to duplicate the data from one slot position and send each copy on the IRB to other units using different unit identifiers. As already mentioned, a common -channel identifier is not disclosed in either of (D1) and (D2).

It can not be considered obvious for a person skilled in the art to add a technical feature not disclosed and use this to solve a problem in a less probable way. Therefore, the invention as claimed in claims 1-12 is considered to involve an inventive step.

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Summary: The invention as claimed in claims 1-12 is novel and has industrial applicability. The invention as claimed in claims 1-12 is considered to involve an inventive step.